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SUDANGRASS

and SORGHUM-SUDANGRASS HYBRIDS FOR FORAGE

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SUDANGRASS and Sorghum-Sudangrass Hybrids for Forage

Sudangrass is an annual that is widely planted in the United States for pasture, green chop, silage, and hay. Where the growing season is long, as many as five cuttings can be obtained in 1 year.

The importance of sudangrass is expected to increase further as a result of sorghum-sudangrass hybrids. Their advantages include a higher yield of forage. In the Gulf Coast States, the hybrids are among the most popular summer annual grazing crops.

Sudangrass is now grown where it was first thought to be wholly unadapted. Its short growing period permits it to produce good crops of hay as far north as Michigan and New York.

In the Rocky Mountain region, conditions generally are unfavorable for growing sudangrass, except in the irrigated valleys. It cannot be grown successfully at the higher altitudes because of frost and low temperatures during the summer months.

The upper limits for profitable hay production seem to be 6,000 to 8,000 feet in New Mexico, Arizona, and southern California; 5,000 to 6,000 feet in Colorado, Utah, Nevada, and northern California; and 4,000 to 5,000 feet farther north.

Sudangrass does best on a rich loam, but it has been grown successfully on almost every type of soil

from heavy clay to light sand. In sandy soil, the yield may be light unless the crops are well fertilized. Cold, wet soils are particularly unsuited for sudangrass, and thorough drainage must be provided for it to grow.

Small amounts of alkali in the soil reduce yields considerably, and large amounts prevent profitable culture. Sudangrass is not especially sensitive to soil acidity. It grows well on soils with a pH as low as 5.5.

DESCRIPTION

Ordinarily sudangrass grows 3 to 5 feet high and has stems about three-sixteenths of an inch in diameter. However, if grown in rows and cultivated, it reaches a height of 6 to 8 feet, and the stems are about one-fourth of an inch in diameter.

The flowering head of the plant is approximately 15 to 30 inches long and about half as wide. The hulls around the seed buds have bristle-shaped tips and are often purplish when the plant is in bloom. Since the bristles are broken off in threshing, commercial seeds rarely have them. Seeds usually are pale yellow when ripe. The leaves are broad and numerous.

Like the cultivated sorghums, sudangrass develops only fibrous



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A single plant of sudangrass, illustrating its growth when planted in rows.

roots and never becomes a noxious weed. Many stems develop from a single seed when given plenty of space. Often, over 100 stems will grow from a single crown.

The sorghum-sudangrass hybrids resemble sudangrass in growth. But the hybrids are taller, have larger stems and leaves, and generally give higher yields.

VARIETIES

The Agricultural Experiment Stations have developed several improved varieties of sudangrass that have greater disease resistance, more leaves, sweeter stems, later maturity, and less prussic acid than common varieties.

Some of these varieties are more popular than others. Among the more popular varieties are Cumberland, Greenleaf, Piper, Sudan 23 (=California 23), Tift, and Wheeler. Certified seed are available for these. Some less popular varieties are Lahoma, Sweet 372, Sweet 372(S1), Sweet 2160, and Westland. Only commercial seed may be available for these.

Before buying sudangrass seed you should determine the variety best adapted to your locality.

Cumberland

Cumberland produces fine stems, long, narrow leaves, and spreading panicles. It is higher yielding than Greenleaf and Piper and is equal to these varieties in disease resistance. The prussic acid level is equal to that of Piper. Cumberland is widely adapted to the Southeast.

Greenleaf

Greenleaf is a vigorous, leafy variety that produces many juicy stems. Because it matures later than many other varieties, Greenleaf produces high yields under favorable soil and moisture conditions.

It is somewhat resistant to leaf blight and anthracnose and it resists some bacterial foliage diseases. In many ways, Greenleaf is similar to Wheeler, a standard variety used in Kansas.

Greenleaf is best adapted to the central latitude in the Midwest.

Piper

Piper has good vigor, early maturity, pithy stems, a low level of prussic acid, and some resistance to

leaf blight and anthracnose. It develops more rapidly than Tift. Piper is well adapted to the northern Corn Belt and the Northeast.

Sudan 23

Sudan 23 (=California 23) matures later and more uniformly than common sudangrass and grows taller and more vigorously. In California, it has outyielded common and Sweet sudangrass. Sudan 23 is susceptible to leaf diseases when grown in humid climates.

Tift

Tift is rather leafy because extra shoots grow from most of the lower joints of the stems. Most of the stems are pithy. The plant is tan-colored and the seeds are a mixture of chocolate and tan.

It matures slightly later than other sudangrass varieties and is more disease resistant. During heavy disease epidemics in the

Southeast, Tift has produced grazing for a month or more after common and Sweet have died.

It is best adapted to the humid Southeastern United States and parts of Texas.

Wheeler

Wheeler produces vigorous seedlings and matures early. It was the first improved variety of sudangrass. Wheeler is generally higher yielding than most common strains, but it is somewhat stemmy and susceptible to disease.

Sorghum-Sudangrass Hybrids

The majority of sorghum-sudangrass hybrids have been developed by crossing forage sorghums with improved varieties of sudangrass. Because sudangrass produces much more pollen than sorghum, seed of sorghum-sudangrass hybrids can



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Sorghum-sudangrass hybrids planted in rows 40 inches apart.

be produced at less cost than seed of forage sorghum hybrids.

Forage sorghums can be harvested only twice during the growing season. Sorghum-sudangrass hybrids, in contrast, can be harvested or pastured three or four times because of their greater tillering capacity (grow more stems from each plant). The hybrids are leafier than typical sorghums but vary in yield, prussic acid content, and growth habit, depending on the particular parents selected for crossing. Normally, the sorghum-sudangrass hybrids outyield the standard sudangrass varieties. The hybrids tend to be coarser because of the sorghum parent.

Sorghum-sudangrass varieties have larger but fewer leaves than standard sudangrass varieties. Growers have found that sorghum-sudangrass hybrids can be used very effectively for grazing, green chop, hay, and silage if precautions are taken to avoid prussic acid poisoning. The hybrids have become one of the most popular summer annual grazing crops in the Gulf States.

CULTURAL PRACTICES

Soil Preparation

Plowing the seedbed in the spring is preferred, because this helps warm the soil. Cool soil causes poor stands and slow growth. If large clumps of soil remain after plowing, disk and harrow the seedbed to smooth it. A firm, well-prepared seedbed will help destroy many annual weeds.

Do not disk or harrow sandy soils after plowing because of wind erosion. Plant in sandy soils immediately after plowing, preferably on a seedbed prepared with a plow-packer attachment. Plant directly in the plowed soil if the attachment is not available.

Seeding

Generally, you should seed sudangrass about 2 weeks after corn-planting time when the soil has become warm.

In the extreme South, the best seeding time for a pasture or hay crop is between April 1 and May 1; in the latitude of Oklahoma and Kansas, between May 1 and June 15; and in the latitude of Nebraska and South Dakota, between May 15 and June 15.

In the Northeastern States, the best seeding time is from June 10 to 25, although seedings may be made as late as July 15. However, planting this late shortens the grazing season.

You may delay the seeding of half an area intended for pasture or green chop, to space production over a longer period. In the case of pasture, the delay will help in the rotation of fields. In the case of green chop, it will permit harvesting in stages.

For grazing, green chop, and hay, broadcast seed at rates of 20 to 30 pounds per acre in humid areas, 12 to 15 pounds in dry areas, and 15 to 20 pounds in irrigated areas. Use a broadcast seeder and cover the seed about 1 inch deep in heavy soil and $1\frac{1}{2}$ inches deep in sandy soil.



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Sudangrass and sorghum-sudangrass hybrids are popular summer annual grazing crops.

For silage production, plant seed in rows at a rate of 5 to 25 pounds per acre. In moist areas, narrow rows from 8 to 24 inches apart will produce larger yields than rows spaced 36 to 40 inches apart. You can adjust row spacing by plugging holes in the grain drill. A grain drill set to sow 2 pecks of wheat per acre will ordinarily sow between 20 and 25 pounds of sudangrass seed per acre.

For seeding rows 36 to 40 inches apart, you need only 3 to 6 pounds of seed per acre, but for rows 8 to 24 inches apart, you need 5 to 25 pounds per acre. The amount of seed you use depends on rainfall as well as row spacing.

Fertilizing

The fertilizer requirements of sudangrass are similar to those of other annual grass crops or corn. Since sudangrass grows rapidly, apply sufficient nitrogen at planting

time to insure establishment of the crop and to hasten development.

Even on the most fertile soils, some nitrogen or a complete fertilizer is frequently advisable. The amount you use will depend on the natural fertility and soil type of the area. The usual recommendation per acre in the Northeast is 150 to 250 pounds of 10-10-10; in the Midwest, 200 to 300 pounds of 3-12-6 or similar ratio; and in the irrigated lands of the West, 30 to 60 pounds of nitrogen.

You should apply phosphorus and potassium where they are lacking. Sudangrass also makes good use of barnyard manure. Use a fertilizer that is best for the production of grass in your area.

HARVESTING

Pasture and Green Chop

Sudangrass is most popular as a temporary or supplemental summer

pasture crop. It fills an important need in many regions of the United States because it grows during the summer when other pasture is in short supply.

In an experiment in western Kansas, sudangrass furnished abundant pasturage for dairy cows, supplying feed for one cow per acre for 125 days. They produced almost 4 pounds more milk per cow on sudangrass than on native-grass pasture.

Beef cattle and sheep gain as much weight when fed sudangrass as they do when fed other kinds of green feed. Beef cattle gains of 2.5 pounds per head per day are common.

To obtain maximum production, the crop should be rotation grazed with other pastures, or divided into subdivisions that are rotated. Sudangrass and sorghum-sudangrass hybrids are usually ready for grazing 5 to 6 weeks after planting. The plants are palatable and readily eaten at the early heading stage, but regrowth will be better when the crop is grazed before heading starts.

To avoid prussic-acid poisoning, sudangrass should not be pastured until it is at least 18 to 24 inches high. When grazing is begun, stock sudangrass heavily so it will be grazed down before heading starts.

For rotating sudangrass pastures, subdivide fields to a size that can be grazed down in about 10 to 14 days. Allow at least 18 inches of regrowth before regrazing. When the crop is handled in this way, the carrying capacity per acre for a short period is six or more animals.

In addition, plant growth will be young, succulent, and highly nutritious throughout the grazing season.

Livestock will graze selectively and trample the crop when growth reaches 40 inches or more. If some fields reach 40 inches before your livestock can graze them, you can harvest them for silage.

Sudangrass and sorghum-sudangrass hybrids are ideally suited for green chop. Cut the plants down to a 6-inch stubble. Make the first cut just before the heading stage to insure good regrowth. Although the forage has a high moisture content, it may be balanced with feeds that are higher in dry matter and protein.

Hay

Highest hay yields are obtained if you harvest the crop when the seed is in the soft-dough stage. Because curing is difficult at this stage, it is more practical to harvest at the boot stage when the plants are 30 to 40 inches high.

Use of hay conditioners, such as a crusher, will reduce the drying time and give higher quality hay. The feed value of good sudangrass hay is about equal to that of millet, timothy, johnsongrass, and other nonlegume roughages.

Because of the large amount of juice in the stems of sudangrass, the leaves cure first, and the hay often appears ready to be put into storage when it is not. To avoid injury by heating, allow sudangrass to remain in shocks or windrows long enough for the stems to become dry.

The leaves keep well, and if the grass is cut at the right stage of

maturity and handled properly, it will make a bright, leafy, sweet hay of high quality.

The time of cutting is sometimes governed by the number of cuttings desired. Often it seems more profitable to cut the first time as early as possible, so that the grass will have more time for the second growth. However, experiments have shown

that early cutting may reduce total yield.

If you use well-adapted varieties, you can extend the harvest over a long period without material loss in quantity or quality of hay. In humid areas, hay quality may be reduced by leaf diseases. In that case, frequent harvests may be necessary to prevent leaf diseases from spreading through the field.

Prussic Acid Poisoning

Young plants and leaves of sudangrass, sorghum hybrids, and sorghum-sudangrass hybrids contain a chemical that breaks down and is released as a poison known as prussic acid or hydrocyanic acid (HCN). The hybrids are often much higher in prussic acid than sudangrass.

Livestock may be poisoned if they eat large amounts of forage with a prussic acid content above 600 parts per million (p.p.m.). It is important, therefore, to learn to recognize conditions under which prussic-acid levels may be high in sudangrass and to avoid feeding such forage.

The prussic acid content is so small by the time the grass is 18 to 22 inches high there is little danger of poisoning. The plants have more prussic acid if the soil is high in nitrogen and deficient in phosphorus and potassium.

An increase in prussic acid content may result when sudangrass is treated with 2,4-D at rates that

stunt the crop. The increased prussic acid level may last several weeks.

Adverse weather conditions such as drought, cold, or frost retard growth and extend the critical period when prussic acid may be present. This period varies for different hybrids and varieties.

Plant tissue killed by freezing contains higher amounts of prussic acid than plant tissue not damaged by cold. Frost that kills the top growth may not kill lower portions of the plant and new shoots may appear.

Cattle frequently avoid the frost-damaged top growth and graze the young shoots where prussic acid may have reached toxic levels. Frosted sudangrass or sorghum-sudangrass hybrids may be used for silage. Do not feed new silage for 2 to 3 weeks. The delay will allow prussic acid to escape.

Prussic acid poisoning is more likely to be a problem in northern States because the period of low temperature is longer than in southern States.

Silage

Sudangrass and sorghum-sudangrass hybrids make acceptable silage for beef and dairy cattle. They have about 90 percent of the feed value of corn silage.

Harvest sudangrass and the hybrids at the soft-dough stage for making silage. At this stage it is unnecessary to wilt the forage or to add a preservative, particularly if sweet-type varieties or hybrids are used.

If the crop is planted in rows, harvest it with conventional silage equipment. Wider rows lessen losses. In 40-inch rows, particularly, the plants are not likely to lodge and the lower leaves last longer.

PEST CONTROL

Sorghum-sudangrass hybrids and sudangrass varieties grown for forage are attacked by various pests such as weeds, diseases, and insects. Among these, weeds perhaps cause the most damage.

Leaf diseases are more common in humid than in dry regions and often reduce yield and lower forage quality. In some years, grasshoppers and chinch bugs can become serious pests.

All chemicals approved for use in pest control must be registered with the U.S. Department of Agriculture. Sometimes changes occur in recommendations for chemical control; therefore, be alert to these changes.

The chart on page 10 outlines the chemical and cultural measures recommended to control pests.

PRECAUTIONS

Pesticides used improperly can be injurious to men and animals. Use them only when needed and handle them with care. Follow the directions and heed all precautions on the labels.

Some States have special restrictions on the use of certain pesticides. Before applying pesticides, check State and local regulations.

Keep pesticides in closed, well-labeled containers in a dry place. Store them where they will not contaminate food or feed, and where children and animals cannot reach them. Promptly dispose of empty pesticide containers; do not use for any other purpose.

When handling a pesticide, wear clean, dry clothing.

Avoid repeated or prolonged contact of pesticide with your skin.

Wear protective clothing and equipment if specified on the container label. Avoid prolonged inhalation of pesticide dusts or mists.

Avoid spilling a pesticide on your skin, and keep it out of your eyes, nose, and mouth. If you get a pesticide on your skin, wash it off immediately with soap and water. If you spill a pesticide on your clothing, remove the clothing immediately and wash the skin thoroughly. Launder the clothing before wearing it again.

After handling a pesticide, do not eat, drink, or smoke until you have washed your hands and face. Wash any exposed skin immediately after applying a pesticide.

COMMON PESTS AND THEIR CONTROL

Pest	Description or symptoms	Methods of control		
		Chemical treatment	Cultural practices	Resistant varieties
Weeds: Pigweed, lambs-quarters, cocklebur, bindweed, and others.	Annual	One-half pound of 2,4-D amine in 5 gallons or more water per acre when crop is 4 to 8 inches tall. Treatments with higher rates may stunt the crop and increase the level of prussic acid in forage. See box on prussic acid poisoning.	Seed bed preparation. Periodic cultivation when crop is grown in rows at least 20 inches apart.	None.
Crabgrass, johnsongrass, foxtail, and others.	Annual and perennial grasses.	None-----	Seed bed preparation. Periodic cultivation when crop is grown in rows at least 20 inches apart.	None.
Diseases: Leaf blight-----	Elongated, straw-colored lesions with reddish margins on leaves.	None-----	Early harvest. Clean culture. Rotation with crops other than grasses and corn will reduce outbreak of many leaf diseases.	Greenleaf, Tift.

Downy mildew	Yellow patches on leaves; newly developed leaves and older plants deformed. From seeding through flowering.	None	Remove debris from field or plow completely under.
Insects:			
Grasshoppers	Strip leaves from plants. Also feed on the heads.	Spray field margins, ditch banks, and adjacent ungrazed land while grasshoppers are small and before they migrate to sudangrass. Use 1 pound of carbaryl or 1 pound of malathion per acre.	None
Chinch bugs	Usually move into sudangrass fields from ripening small grains. Nymphs and adults suck plant juices, weakening and sometimes killing the plants.	Spray with 1 pound of carbaryl per acre as soon as migration from small grain fields begins.	None

Avoid drift of pesticide to nearby wildlife habitats, bee yards, crops, or livestock. Do not apply pesticides under conditions favoring drift from the area to be treated.

Many pesticides are highly toxic to fish and aquatic animals. Keep pesticides out of all water sources such as ponds, streams, and wells. Do not clean spraying equipment or dump excess spray material near such water.

Do not apply pesticides to plants during hours when honey bees and

other pollinating insects are visiting them.

Have empty pesticide containers buried at a sanitary land-fill dump, or crush and bury them at least 18 inches deep in a level, isolated place where they will not contaminate water supplies.

It is difficult to remove all traces of herbicides from equipment. For this reason, make sure your herbicide sprayer is free of residue or do not use it for insecticides and fungicides.

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